# ANCOVA: Week 8
# Program Transcript

MATTHEW JONES: This week, we'll be examining ANCOVA, Analysis Of Covariance. ANCOVA is much like one-way ANOVA, except rather than simply looking at differences in a mean between a factor, we are now looking at differences in the mean between a factor while controlling for a continuous variable, a covariate.

The question we're going to explore this week is whether there are differences in asking for help between gender while controlling for levels of math comfortability. Does this sound familiar? It should. This is the question we explored in week 2 when we were engaged in moderation analysis. I'll talk a little bit about how ANCOVA and moderation analysis have some relationship to each other on a basic level.

To perform an ANCOVA, we click on Analyze, General Linear model and once again, the Univariate General Linear Model. And we're going to enter fear of asking for help as our dependent variable. Our fixed factor is going to be gender.

So what we have set up there so far is essentially just a one-way ANOVA. But we want to control for levels of math comfortability. And we're going to move that over into the covariate box. So if you remember in week 2 when we were talking about moderation analysis, I mentioned that this math comfortability measure might have been given to students before they entered class, perhaps with an intake counselor.

So we're going to select Model. What we need to do is click on the button Custom. And we're going to highlight both gender and math and make sure that where it says build terms interaction is listed. So we move that over. So we have built-in interaction.

So again, this should sound very familiar. This sounds like we're talking about a moderation analysis. We're also going to want to move over our individual main effects, math comfortability, and gender. And we'll click Continue.

And we're going to click also on Options. Display means for gender. Remember, we're still doing some sort of comparison of means test here, so it's always handy to have our means displayed. Compare main effects. We'll drop down, click on Bonferroni. And when I'm doing ANCOVA, I also like to click on Parameter Estimates. And I'll show you why in a second. Click Continue. Click OK.

So in our ANCOVA, our interaction is something we really want to go to first and see whether there's an interaction. So we see here, looking at this product, gender and math comfort. That's our interaction. We see it's not statistically

significant. We have a value there of 0.497, so that's well above the 0.05 threshold.

So a couple of things we can do. We can go ahead and interpret the model with the null interaction. But most people recommend going back and rebuilding the model without the interaction. Because you know there is no interaction present. So let's just go ahead and reset everything. That clears all the dialog boxes out.

Fear of asking for help is our dependent variable. Gender is our fixed factor. Math comfortability as our covariate. And I'm going to go to Options again, display means. I'm going to compare main effects with the Bonferroni. Estimate of effect size is always great to click on so you know a little something about that. Parameter estimates as well. And click Continue. And OK. And we're ready to interpret this output.

And so now we can go ahead and interpret our results. So here we have some basic between subject factors. It just tells us the sample sizes for each. We see that our overall ANCOVA is statistically significant. We have our two main effects of math comfortability and gender. Again, they are statistically significant. So there is some difference in levels of fear across gender controlling for math comfortability. And we have our parameter estimates.

Now, the parameter estimates should be interesting to you. Because if you go back and do your moderation analysis using the same question, you'll see that there are some similarities. Particularly look in the parameter estimates here. You have a beta, so you have a beta of 1.244. If you remember in our moderation analysis, using the same variables, that was the same data. So this tells you a little bit about the moderation or the regression analysis.

So moving further down, we have some more descriptive statistics about our mean. One thing to note here, though-- it's really important to note-- you'll see a little A next to each of these means. And underneath estimates, covariates appearing in the model are evaluated at the following values. That means the means are adjusted by controlling for that math comfortability.

So in some sense, this math comfortability is really a pretest that we've tested students before they came into the course, and now we're controlling for it. So it's adjusted those means. And looking at our pairwise comparisons, we see that indeed there is a difference between males and females that's statistically significant.

So we can see that here in our descriptive values. And here we're testing it for a statistical significance. There's a difference of 1.244.

Circling back up here to our parameter estimates here, we see that beta is negative 1.244. So again, if we had dumped that into a regression model as a dummy variable, we would get the same result. And it is statistically significant.

So there still is a statistically significant difference between males and females and their fear of asking for help while controlling for their level of comfort with math. So females in this example have a slightly higher level of fear compared to males, controlling for comfortability with math.

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